

## CLAIMS

1. A mechanical part (50, 110) presenting a main direction along which there extend a central zone forming a core (52) and a peripheral zone forming a casing (54)  
5 which surrounds said core (52), said core (52) and said casing (54) presenting a metallurgical bond between each other, said core (52) being made of a first material presenting at least a metal matrix, and said casing (54) being made of a second material presenting at least a  
10 metal matrix, the part being characterized in that said metal matrices of the first and second materials having the same base metal, and in that at least one of said first and second materials is made of a metal matrix composite containing reinforcing elements dispersed in  
15 said metal matrix.
2. A mechanical part (50, 110) according to claim 1, characterized in that said base metal is aluminum.
- 20 3. A mechanical part (50, 110) according to claim 2, characterized in that said metal matrices of the first and second materials are respectively constituted by a first alloy and a second alloy, said first alloy and said second alloy being selected from aluminum-based alloys of  
25 the ASTM standards series 2000, 5000, 6000, or 7000.
4. A mechanical part (50, 110) according to claim 3, characterized in that said first alloy and said second alloy are selected from the same series of aluminum-based  
30 alloys selected from said ASTM standard series 2000, 5000, 6000, or 7000, and in particular from the 2000 series.
5. A mechanical part (50, 110) according to any one of  
35 claims 1 to 4, characterized in that said reinforcing elements are particles of silicon carbide (SiC), of

alumina ( $\text{Al}_2\text{O}_3$ ), or of metal carbide such as tungsten, boron, or titanium carbide.

5 6. A mechanical part (50, 110) according to claim 5, characterized in that said reinforcing elements represent no more than 50% by weight of the composition of said metal matrix composite.

10 7. A mechanical part (50, 110) according to claim 6, characterized in that said reinforcing elements represent 5% to 35% and preferably 10% to 20%, and more preferably about 15% by weight of the composition of said metal matrix composite.

15 8. A mechanical part (50, 110) according to any one of claims 1 to 7, characterized in that one of said first and second materials is made of said metal matrix composite containing said reinforcing elements dispersed in said metal matrix, the other one of said first and  
20 second materials being made of said metal matrix only.

9. A mechanical part (50, 110) according to claim 8, characterized in that said first material is made of said metal matrix only which comprises aluminum as its base  
25 metal, and in that said second material is made of said metal matrix composite containing said reinforcing elements dispersed in said metal matrix, said metal matrix having aluminum as its base metal and said reinforcing elements being made of silicon carbide ( $\text{SiC}$ )  
30 particles.

10. A mechanical part (50, 110) according to any one of claims 1 to 7, characterized in that said first and second materials are made of said metal matrix composite  
35 containing said reinforcing elements dispersed in said metal matrix, said reinforcing elements representing different percentages by weight of the composition of

said metal matrix composite in said core (52) and in said casing (54).

11. A mechanical part (50, 110) according to claim 10,  
5 characterized in that said reinforcing elements represent a percentage by weight of the composition of said metal matrix composite that varies progressively in said first material and in said second material going from the center of said core (52) towards the periphery of said  
10 casing (54).

12. A mechanical part (50, 110) according to claim 10 or claim 11, characterized in that for said reinforcing elements, said first material presents a percentage by  
15 weight of the composition of said metal matrix composite that is greater than in said second material.

13. A mechanical part (50, 110) according to claim 10 or claim 11, characterized in that for said reinforcing  
20 elements, said second material presents a percentage by weight of the composition of said metal matrix composite that is greater than in said first material.

14. A blade (50, 110) constituted by a mechanical part  
25 according to any one of claims 1 to 13.

15. A low pressure compressor including stationary vanes and/or moving blades according to claim 14.

30 16. A turbojet fan (104) including blades (110) according to claim 14.

17. A method of manufacturing a mechanical part (50, 110) according to any one of claims 1 to 13, the method being  
35 characterized in that it comprises the following successive steps:

a) compacting to make a semi-finished product containing a core (52) and a casing (54), said core (52) and said casing (54) presenting a metallurgical bond between each other, said core (52) being made of a first material presenting at least a metal matrix, and said casing (54) being made of a second material presenting at least a metal matrix, said metal matrices of the first and second materials having the same base metal, and at least one of said first and second materials being made of a metal matrix composite containing reinforcing elements dispersed in said metal matrix;

b) forging the semi-finished product to obtain a blank; and

c) machining said blank to provide a finished product forming said mechanical part.

18. A method of manufacture according to claim 17 for obtaining a mechanical part according to claim 11, the method being characterized in that said step a) consists in forming the core (52) and the casing (54) conjointly by the powder metallurgy technique.

19. A method of manufacture according to claim 17 for obtaining a mechanical part according to any one of claims 1 to 10, characterized in that said step a) consists in performing the following substeps in succession:

a1) using said first material to make a rod (10) extending in a longitudinal direction, said rod (10) serving to form said core (52) placed in the center of the mechanical part;

a2) using said second material to make a sleeve (20) extending in a longitudinal direction, said sleeve (20) serving to form the casing (54) of the mechanical part by surrounding said core (52);

a3) inserting the rod (10) into the sleeve (20) to form an assembly (30); and

a4) passing said assembly (30) through an orifice of small section in order to reduce at least one dimension of said assembly in a direction perpendicular to said longitudinal direction in order to create a metallurgical  
5 bond between said rod (10) and said sleeve (20).

20. A method according to any one of claims 17 to 19, characterized in that said substep a4) consists in rolling or extrusion.  
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21. A method according to any one of claims 17 to 20, characterized in that said step b) consists in die stamping.